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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/616,364	07/13/2000	Mineharu Uchiyama	PM 271598 T4YK-00S0603	6820

909 . 7590 10/01/2003

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EXAMINER	
BATTAGLIA, MICHAEL V	

ART UNIT	PAPER NUMBER
2652	7

DATE MAILED: 10/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/616,364	UCHIYAMA, MINEHARU	
	Examiner	Art Unit	
	Michael V Battaglia	2652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 July 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *27,28 and 30-32* is/are allowed.

6)☒ Claim(s) *1-26,29 and 33* is/are rejected.

7)☒ Claim(s) *1-5,7-13,15-16,18-20,and 27-33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 July 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *25* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings are objected to because Fig. 3A does not provide a key or otherwise indicate what the squares and diamonds represent. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

4. Claims 1, 7, 10, 16, 18, 27-28 and 33 and therefor 2-5, 8-9, 11-13, 15, 19-20, and 29-32 are objected to because of the following informalities:

a. In regard to claim 1, the examiner suggests positively claiming the objective lens referred to on lines 11 and 12 because the objective lens must be present in the invention to meet the claim.

b. On line 4 of claim 7, the examiner suggests replacing "m" with -m1-.

c. On line 7 of claim 7, the examiner suggests replacing "m" with -m2-.

d. In regard to claim 10, the examiner suggests positively claiming the recording medium referred to on lines 10 and 11 and the photodetector referred to on line 11 because the recording medium and photodetector must be present in the invention to meet the claim.

e. On line 4 of claim 16, the examiner suggests inserting -lens- after "objective".

f. In regard to claim 18, the examiner suggests positively claiming the recording medium referred to on line 10 because the recording medium must be present in the invention to meet the claim.

g. On line 14 of claim 18, the examiner suggests replacing "coincide" with -coincides-.

h. On line 16 of claim 18, the examiner suggests removing "than another one".

i. On lines 16 and 17 of claim 18, the examiner suggests rewriting "to near position to" with -nearer to the position of-.

j. On line 18 of claim 18, the examiner suggests inserting -to- between "than" and "the".

k. In regard to claims 27 and 28, the examiner suggests positively claiming the light-receiving element referred to on line 15 of claims 27 and 28 because the recording light-receiving element must be present in the invention to meet the claims.

l. On line 22 of claim 33, the examiner suggests inserting -lens- after "objective".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 23 contradicts the limitation claimed in claim 21 that the center of the hologram is aligned with the midpoint between the optical axis of the first light source and that of the second light source in projection of the hologram by claiming the limitation in claim 23 that the center of the hologram is closer to the optical axis of the first light source than it is to the optical axis of the second light source. Hence, the meets and bounds of the claim cannot be determined and require speculation.

A search has been made to find the most pertinent art, but no art rejection will be made in this office action regarding claim 23, due to the speculation required to interpret the claims because of their indefiniteness under 35 U.S.C. 112, 2nd paragraph as noted above (see *In re Steele*, 134 USPQ 292).

6. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 24 claims both a hologram apparatus and a method of using the hologram to sense a shift in focus error and is therefor indefinite because the claim does not provide an accurate determination of the metes and bounds of protection involved so that an evaluation of the possibility of infringement may be ascertained with a reasonable degree of certainty (see *Ex parte Lyell).*

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 24 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 24 is directed to neither a "process" nor a "machine," but rather embraces or overlaps two different statutory classes of invention set forth in 35 U.S.C. 101 which is drafted so as to set forth the statutory classes of invention in the alternative only.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claim 1, 4, 6, 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohyama (US 6,366,548).

In regard to claim 1, Ohyama discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Figs. 4A and 4B, element 9); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Figs. 4A and 4B, element 8); a single block wherein the first and the second light source are aligned thereon (Figs. 4A and 4B, element 5); and a diffraction grating which is provided on the optical

path between said first light source and an objective lens and on the optical path between said second light source and the objective lens and which has a first-order diffraction efficiency of almost zero for the light beam from said first light source and emits the first-order diffraction light for the light beam from said second light source (Figs. 3, 4A, 4B, 5A, and 5B, element 14 and Col. 7, lines 64-67). The examiner notes that Ohyama shows an objective lens with the rest of the optical head device as claimed in claim 1 (Fig. 3, element 11).

In regard to claim 4, Ohyama discloses that the first-order diffraction light from said second light source is used to sense a tracking error signal (Col. 8, lines 60-64 and Col. 7, lines 64-67).

In regard to claim 6, Ohyama discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Figs. 4A and 4B, element 9); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Figs. 4A and 4B, element 8); a single block wherein the first and the second light source are aligned thereon (Figs. 4A and 4B, element 5); a first diffraction grating which has a first order diffraction efficiency of almost zero for the light beam from said first light source and emits the first-order diffraction light for the light beam from said second light source (Figs. 3, 4A, 4B, 5A, and 5B, element 14 and Col. 7, lines 64-67); and a second diffraction grating which emits the first-order diffraction light for the light beam from said first light source and has a first-order diffraction efficiency of almost zero for the light beam from said second light source (Figs. 3, 4A, 4B, 5A, and 5B, element 13 and Col. 7, lines 64-67). The examiner notes that Ohyama shows an objective lens with the rest of the optical head device as claimed in claim 6 (Fig. 3, element 11).

In regard to claim 9, Ohyama discloses that said first diffraction grating and said second diffraction grating are formed integrally on a substrate (Figs. 3, 4A, 4B, 5A, and 5B, element 12).

10. Claims 14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Funato (US 6,072,579).

In regard to claim 14, Funato discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Fig. 10, element 1'); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 10, element 2'); a single block wherein the first and the second light source are aligned thereon (Fig. 10, element 12); and an objective lens for causing the light beams from said first light source and second light source to converge on a recording medium (Fig. 10, element 6), wherein the optical axis of said objective lens is positioned asymmetrically with the optical axes of said first and second light sources (Fig. 10).

11. In regard to claim 16, Funato discloses that the optical axis of said second light source almost coincides with the optical axis of said objective (Fig. 9).

12. Claims 18-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Kuono (US 6,404,709).

In regard to claim 18, Kuono discloses an optical head device comprising; a first light source for emitting a light beam of a first wavelength (Fig. 1, element LD1); a second light source which emits a second wavelength differing from said first light wavelength (Fig. 1, element LD2); a single block wherein the first and the second light source are aligned thereon (Fig. 1, element 102); and an objective lens for causing the light beams from said first light source and second light source to converge on a recording medium, wherein the position of the optical axis of said objective lens is disposed at least between the optical axes of beams of said first and second light sources, and the optical axis of said objective lens coincides with the optical axis of the beam of light of a shorter wavelength (Fig. 1, element 4 and Col. 4, lines 24-28).

In regard to claim 19, Kuono discloses that the said recording medium includes a first disk to be read from when said first light source is used and a second disk to be read from when said second light source is used, wherein the substrate thickness of the first disk is thinner than the substrate thickness of the second disk and the distance between the optical axis of first light source and the optical axis of said objective lens is less than the distance between the optical axis of second light source and the optical axis of said objective lens (Col. 4, lines 24-28; Col. 1, lines 36-45; and Fig. 1).

13. Claims 21-22 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Kitamura et al (US 5,986,996) (hereafter Kitamura).

In regard to claim 21, Kitamura discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Fig. 17, element 3b); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 17, element 3a); an objective lens for causing the laser light from said first or second light source to converge on an optical disk (Fig. 16, element 5); a single block wherein the first and the second light source are aligned thereon (Figs. 16-17, element 3); and a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element, wherein the center of said hologram is aligned with the midpoint between the optical axis of said first light source and that of said second light source in projection on said hologram (Fig. 16, element 6).

In regard to claim 22, Kitamura discloses that if the distance between the center of said hologram and the optical axis of said first light source is d1 and the distance between the center of said hologram and the optical axis of said second light source is d2 in a projection plane in the

direction of the optical axis of said objective lens, the equation d1 = d2 is almost satisfied (Figs. 16-17).

In regard to claim 25, Kitamura discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Fig. 17, element 3b); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 17, element 3a); a single block wherein the first and the second light source are aligned thereon (Figs. 16-17, element 3); an objective lens for causing the laser light from said first or second light source to converge on an optical disk (Fig. 16, element 5); and a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element (Fig. 16, element 6), wherein if the distance between said first light source and said second light source is d, the distance between said first and second light sources and said hologram is in the range from 20d to 40d (Figs. 16-17).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohyama in view of Katsuma (US 6,094,308).

Ohyama discloses an optical head device as claimed in claim 1. Ohyama does not disclose that the diffraction grating has a groove depth h0 expressed by $h0 = m \cdot \lambda 1/(n-1)$ where n is the

refractive index of said diffraction grating, $\lambda 1$ is the wavelength of said first light source, and m is a natural number.

Katsuma discloses an optical head device comprising a first and second light source emitting light beams of different wavelength and a diffraction grating, which is provided on the optical path between a first light source (Fig. 6, element 1C) and an objective lens (Fig. 6, element 5) and on the optical path between a second light source (Fig. 6, element 1B) and the objective lens and which has a first-order diffraction efficiency of almost zero for the light beam from one of the said light sources and emits the first-order diffraction light for the light beam from the other said light source (Col. 2, lines 50-54). Katsuma further discloses that the diffraction grating has a groove depth h0 expressed by $h0 = m \cdot \lambda 1/(n-1)$ where n is the refractive index of said diffraction grating, $\lambda 1$ is the wavelength of the light that is not diffracted, and m is a natural number (Col 2, lines 21-41). Katsuma teaches that a diffraction grating with a groove depth meeting the aforementioned expression will efficiently direct light beams of different wavelengths to their corresponding optical media (Col. 1, lines 12-17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the groove depth of the diffraction grating of Ohyama meet the diffraction grating groove depth expressed by Katsuma; the motivation being to have a diffraction grating that efficiently directs light beams of different wavelengths to their corresponding optical media.

15. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohyama in view of Katsuma in further view of Shiono et al (US 6,414,930).

Ohyama in view of Katsuma discloses the optical head device as claimed in claims 1-2. Ohyama in view of Katsuma does not disclose that the natural number m is 1.

Shiono discloses a diffraction grating that meets the groove depth expression of Katsuma, wherein the natural number m is 1 (Col. 12, lines 61-62). Shiono teaches that with this groove depth, the diffraction grating will have maximum first-order diffraction efficiency (Col. 12, lines 62-64).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the diffraction grating with the groove depth expression of Ohyama in view of Katsuma with m in the expression equal to 1 as suggested by Shiono; the motivation being to have maximum first-order diffraction efficiency.

16. Claim 5/11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohyama in view of Nakajima et al (US 5,541,909) (hereafter Nakajima).

Ohyama discloses an optical head device as claimed in claims 1 and 4. Ohyama does not disclose that the said first light source and second light source are a multi-wavelength semiconductor laser array.

Nakajima discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Fig. 8, element 21a); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 8, element 21b); and a single block wherein the first and the second light source are aligned thereon (Fig. 8, element 21). Nakajima further discloses that the first and second light sources are a multi-wavelength semiconductor laser array (Col. 7, lines 51-53) and teaches that providing the two light sources by using a multi-wavelength semiconductor laser array will facilitate simplification of optics and stabilization of the light spot irradiation position (Col. 7, lines 56-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a multi-wavelength semiconductor laser array for the two light sources in the optical head device of Ohyama as suggested by Nakajima; the motivation being to facilitate simplification of optics and stabilization of the light spot irradiation position.

17. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohyama in view of Katsuma.

Ohyama does not disclose the depth h01 of the grating groove of said first diffraction grating is expressed by $h01 = m1 \cdot \lambda 1/(n-1)$ and the depth h02 of the grating groove of said second diffraction grating is expressed by $h02 = m2 \cdot \lambda 2/(n-1)$ where n1 is the refractive index of said first diffraction grating, n2 is the refractive index of said second diffraction grating; $\lambda 1$ is the wavelength of said first light source; $\lambda 2$ is the wavelength of said second light source, and ml and m2 are natural numbers.

Katsuma discloses an optical head device comprising a first and second light source emitting light beams of different wavelength and a diffraction grating, which is provided on the optical path between a first light source (Fig. 6, element 1C) and an objective lens (Fig. 6, element 5) and on the optical path between a second light source (Fig. 6, element 1B) and the objective lens and which has a first-order diffraction efficiency of almost zero for the light beam from one of the said light sources and emits the first-order diffraction light for the light beam from the other said light source (Col. 2, lines 50-54). Katsuma further discloses that the diffraction grating has a groove depth h expressed by $h = m \cdot \lambda/(n-1)$ where n is the refractive index of said diffraction grating, λ is the wavelength of the light that is not diffracted, and m is a natural number (Col 2, lines 21-41). Katsuma teaches that a diffraction grating with a groove depth meeting the aforementioned

expression will efficiently direct light beams of different wavelengths to their corresponding optical media (Col. 1, lines 12-17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the groove depth of each of the diffraction gratings of Ohyama meet the diffraction grating groove depth expression of Katsuma using the wavelength of the light beam that is not diffracted ($\lambda 1$ or $\lambda 2$) as the value for λ; the motivation being to have diffraction gratings that efficiently direct light beams of different wavelengths to their corresponding optical media.

18. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohyama in view of Katsuma in further view of Shiono.

Ohyama in view of Katsuma discloses the optical head device as claimed in claims 6-7. Ohyama in view of Katsuma does not disclose that the natural numbers m1 and/or m2 are 1.

Shiono discloses diffraction gratings that meet the groove depth expressions of $m1 \cdot \lambda 1/(n-1)$ and $m2 \cdot \lambda 2/(n-1)$, wherein the natural numbers m1 and m2 are 1 (Col. 12, lines 61-62 and 64-65). Shiono teaches that with these groove depths, the diffraction grating will have maximum first-order diffraction efficiency for the respective wavelength (Col. 12, lines 62-64 and 65-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the diffraction gratings with the groove depth expressions of Ohyama in view of Katsuma with the natural numbers in the expressions equal to 1 as suggested by Shiono; the motivation being for each of the diffraction gratings to have a maximum first-order diffraction efficiency for the light of the wavelength to be diffracted.

19. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al (US 6,211,511) (hereafter Shih) in view of Kubo (US 5,684,762).

In regard to claim 10, Shih discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Fig. 6, element 610a); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 6, element 610b); a single block wherein the first and the second light source are aligned thereon (Fig. 6, element 612); and a hologram which projects a light beam onto a recording medium and directs the reflected light from the recording medium to a photodetector (Fig. 6, element 620). Shih does not disclose that the hologram is a nonpolarization hologram.

Kubo discloses an optical head device that uses a nonpolarization hologram to direct reflected light from a recording medium to a photodetector (Fig. 2, element 27 and Col. 4, lines 29-31). Kubo teaches that use of the nonpolarization beam splitter is preferable because a nonpolarization hologram can be mass-produced and is relatively inexpensive when compared to a polarizing beam splitter (Col. 9, lines 42-52).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a nonpolarization hologram in the optical head device of Shih as suggested by Kubo; the motivation being to use a beam splitting element that can be mass produced and that is relatively inexpensive.

In regard to claim 11, the hologram of Shih has an asymmetrical grating (Fig. 6, element 620).

20. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shih in view of Kubo in further view of Komma et al (US 5,687,153) (hereafter Komma).

Shih in view of Kubo discloses the optical head device as claimed in claim 10. Shih in view of Kubo does not disclose that the nonpolarization hologram has asymmetrical or blazed gating.

Komma discloses an optical head device wherein a hologram with asymmetrical grating projects a light beam onto a recording medium and directs the reflected light from the recording medium to a photodetector (Fig. 14, elements 1, 5, and 7). The hologram has a blaze grating (Fig. 14, element 1) and Komma teaches that if the hologram is not blazed, the hologram diffracts unnecessary light on the path from a light source to the recording medium that is reflected by the recording medium becomes noise in the servo and data signals when incident on the photodetecter (Col. 2, lines 4-19).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have blaze grating on the nonpolarization hologram of Shih in view of Kubo as taught by Komma; the motivation being to reduce noise in the servo and data signals.

21. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shih in view of Kubo in further view of Oohchida et al (US 6,584,060) (hereafter Oohchida).

Shih in view of Kubo discloses the optical head device as claimed in claim 10. Shih in view of Kubo does not disclose that the nonpolarization hologram has asymmetrical stepwise gating.

Oohchida discloses an optical head device wherein a hologram projects a light beam onto a recording medium and directs the reflected light from the recording medium to a photodetector (Fig. 1A, elements 31, 51, and 103 and Figs. 10D). Oochida further discloses that the hologram has an asymmetrical stepwise grating and teaches that use of the asymmetrical stepwise grating can increase the signal to noise (S/N) ratio and reliability by detecting an intensified $+1^{st}$ order diffraction component of returning light (Col. 18, lines 35-53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have asymmetrical stepwise grating on the nonpolarization hologram of

Shih in view of Kubo as taught by Oohchida; the motivation being to increase the S/N ratio and reliability.

22. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shih in view of Kubo in further view of Oohchida.

Shih discloses that the said recording medium includes a first disk to be read from when said first light source is used and a second disk to be read from when said second light source is used, wherein the substrate thickness of the first disk is thinner than the substrate thickness of the second disk (Col. 1, lines 43-46 and Col. 8, lines 59-64) and the distance between the optical axis of first light source (Fig. 5C, element 510b) and the optical axis of said objective lens is less than the distance between the optical axis of second light source (Fig. 5C, element 510a) and the optical axis of said objective lens (Fig. 5C and Col. 7, line 66 - Col. 8, line 4). The examiner notes that Fis. 5C and Col. 7, line 66 - Col. 8, line 4 show and describe an optical axis of the system and Fig. 2 shows the optical axis of the objective lens aligned with the described optical axis of the system.

23. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funato in view of Nakajima.

Funato discloses an optical head device as claimed in claim 14. Funato does not disclose that the said first light source and second light source are a multi-wavelength semiconductor laser array.

Nakajima discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Fig. 8, element 21a); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 8, element 21b); and a single block wherein the first and the second light source are aligned thereon (Fig. 8, element 21). Nakajima further discloses that the first and second light sources are a multi-wavelength semiconductor laser

array (Col. 7, lines 51-53) and teaches that providing the two light sources by using a multi-wavelength semiconductor laser array will facilitate simplification of optics and stabilization of the light spot irradiation position (Col. 7, lines 56-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a multi-wavelength semiconductor laser array for the two light sources in the optical head device of Funato as suggested by Nakajima; the motivation being to facilitate simplification of optics and stabilization of the light spot irradiation position.

24. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kouno in view of Nakajima.

Kouno discloses an optical head device as claimed in claim 18. Kouno does not disclose that the said first light source and second light source are a multi-wavelength semiconductor laser array.

Nakajima discloses an optical head device comprising: a first light source for emitting a light beam of a first wavelength (Fig. 8, element 21a); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 8, element 21b); and a single block wherein the first and the second light source are aligned thereon (Fig. 8, element 21). Nakajima further discloses that the first and second light sources are a multi-wavelength semiconductor laser array (Col. 7, lines 51-53) and teaches that providing the two light sources by using a multi-wavelength semiconductor laser array will facilitate simplification of optics and stabilization of the light spot irradiation position (Col. 7, lines 56-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a multi-wavelength semiconductor laser array for the two light sources in

the optical head device of Kuono as suggested by Nakajima; the motivation being to facilitate simplification of optics and stabilization of the light spot irradiation position.

25. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura in view of Hoshino et al (US 5,243,585) (hereafter Hoshino).

Kitamura discloses an optical head device as claimed in claim 21. Kitamura does not disclose that the hologram senses a shift in focus by a mixed aberration method.

Hoshino discloses a replacing a hologram element with a multi-functional element having the function of a hologram and a converging lens that can be used sense a shift in focus using a mixed aberration method (Fig. 37, element 61; Col. 24, line67 - Col. 25, line2; and Col. 25, lines 10-17). Hoshino teaches that the multi-functional element produces light beams with symmetric shapes when the light spot on the recording surface of the optical disc is focused that can be used to detect a focus error (Col. 25, lines 10-22).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multi-functional element having the function of a hologram and capable of sensing a shift in focus by a mixed aberration method in the optical head device of Kitamura as taught by Hoshino, the motivation being reduce the number of elements in the optical head device while still being able to obtain a focusing error signal.

26. Claims 26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura in view of Kubo.

In regard to claim 26, Kitamura discloses an optical head device as claimed in claim 25. Kitamura does not disclose that the hologram is a nonpolarization hologram.

Kubo discloses an optical head device that uses a nonpolarization hologram to direct reflected light from a recording medium to a photodetector (Fig. 2, element 27 and Col. 4, lines

29-31). Kubo teaches that use of the nonpolarization beam splitter is preferable because a nonpolarization hologram can be mass-produced and is relatively inexpensive when compared to a polarizing beam splitter (Col. 9, lines 42-52).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a nonpolarization hologram in the optical head device of Kitamura as suggested by Kubo; the motivation being to use a beam splitting element that can be mass produced and that is relatively inexpensive.

In regard to claim 29, Kitamura discloses that if the numerical aperture when the light beam from said first light source is used is NA1 and the numerical aperture when the light beam from said second light source is used is NA2, the expression NA1 > NA2 is satisfied (Col. 30, lines 42-53).

27. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al (US 6,385,158) (hereafter Takagi) in view of Kitamura.

Takagi discloses a disk drive system comprising: a first light source for emitting a light beam of a first wavelength (Fig. 3, element 291); a second light source which emits a light beam of a second wavelength differing from said first wavelength (Fig. 3, element 292); a single block wherein the first and the second light source are aligned thereon (Fig. 3, element 29); and a diffraction grating which is placed on the optical path between said first light source and an objective lens and on the optical path between said second light source and the objective and which produces almost 100% of the 0-order diffraction light for the light beam from said first light source and has a first-order diffraction efficiency of almost zero and emits the 0-order and first-order diffraction light for the light beam from said second light source (Fig. 3, element 27 and Col. 5, lines 35-42 and 50-58); a half mirror which is placed on the optical path between said objective lens and said

diffraction grating and directs the light projected on an optical disk via said objective lens and reflected from the optical disk via said objective lens to a light-receiving element (Fig. 3, elements 1, 21-22, and 25); and a signal processing circuit which processes the photoelectric conversion output from said light-receiving element and subjects the photoelectric conversion output of the reflected light corresponding to said first-order diffraction light to a tracking error process and obtains a signal playback output and/or a tracking error signal by phase sensing for the photoelectric conversion output of the reflected light corresponding to the 0-order diffraction light (Fig. 2, element 5). Takagi does not use a hologram, placed on the optical path between said objective lens and said diffraction grating, to direct light projected on an optical disk via said objective lens and reflected from the optical disk via said objective lens to a light-receiving element and instead uses a half mirror.

Kitamura discloses an optical head device and recording system that can be used in a disk drive system. Kitamura further discloses using a hologram which is placed on the optical path between said objective lens and said diffraction grating and directs the light projected on an optical disk via said objective lens and reflected from the optical disk via said objective lens to a light-receiving element (Fig. 16, element 6). Use of a hologram instead of a half mirror enables the optical head device to use an integrated device (Figs. 16-17, element 10) that has laser beam sources monolithically formed together with photodetectors, which makes the optical head device compact and inexpensive (Col. 6, lines 37-44).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the half mirror of the Takagi disk drive system with the hologram of the Kitamura; the motivation being to make the optical head part of the disk drive system compact and inexpensive.

Citation of Relevant Prior Art

28. Yamamoto et al (US 5,757,754) teaches that a non-polarization hologram can be used to replace a polarizing hologram and a ¼ wave plate (Col. 27, lines 59-63). Yanagawa (US 6,363,038) discloses an optical head device with an objective lens that tilts and makes the optical axis of the objective lens asymmetric with the optical axis of an irradiation system (Fig. 12). Takekoshi et al (US 5,825,022) discloses alignment marks in the shape of a cross on the surface of a holographic element that are used to facilitate positioning in the assembly process (Fig. 41 and Col. 26, lines 33-56). Feldman et al (US 5,923,796) teaches using alignment marks on a hologram (Col. 8, lines 61-66). Nemoto (US 6,358,764) discloses an optical head device comprising: first and second light sources emitting lasers of different wavelengths formed in a single unit, a diffraction grating, and a beam splitter that directs reflected light towards a photodetector (Fig. 8). Katayama (US 5,570,333) teaches the use of a nonpolarization hologram (Col. 11, lines 29-32 and Col. 12, lines 54-58). Kata et al (US 6,115,345) discloses hologram with an asymmetrical blaze grating to direct reflected light towards photodetectors (Fig. 16). Abe et al (US 6,084,843) discloses a second light source with an optical axis that is asymmetric to the optical axis of the objective lens (Fig. 10). Akiyama (US 6,240,053) and Nakamura et al (US 5,361,244) each have two light sources formed in a single unit and a hologram that diffracts reflected light towards photodetectors (Fig. 7A and Fig. 1 respectively).

Allowable Subject Matter

29. Claims 27-28 and therefor 30-32 are allowable over prior art.

In regard to claim 27, none of the references alone or in combination disclose or suggest a hologram in an optical head device having a marker, for use in installation of the hologram, in the projected position of a second light source.

In regard to claim 28, none of the references alone or in combination disclose or suggest a hologram in an optical head device having a marker, for use in installation of the hologram, in the position of the midpoint between the projected positions of the optical axes of a first and second light source.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V. Battaglia whose telephone number is (703) 305-4534. The examiner can normally be reached on 5-4/9 Plan with 1st Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

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9/22/07